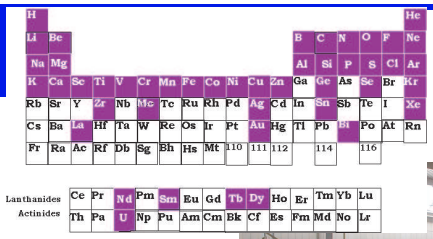
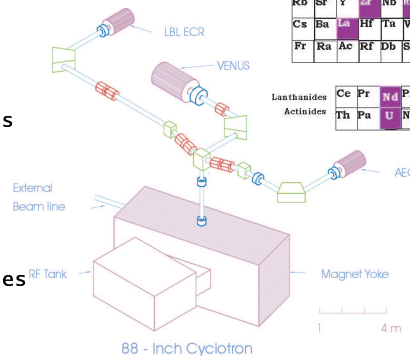
The 88-Inch Cyclotron at Berkeley Lab

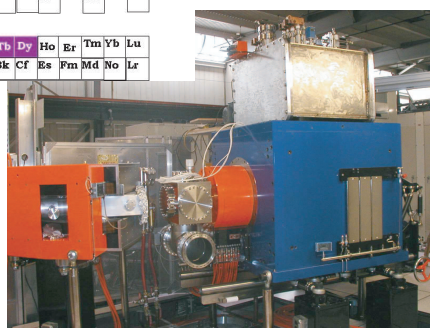
The 88-Inch Cyclotron is a versatile accelerator of beams from hydrogen to uranium. It is operated as a national facility in support of U.S. Department of Energy programs in nuclear science. At the Cyclotron, scientists from LBNL and other national laboratories, universities and foreign institutions carry out forefront scientific research in the areas of nuclear structure and reactions, weak interactions, nuclear astrophysics and nuclear chemistry. The Cyclotron plays an important role in the education and training of young scientists in nuclear physics and chemistry.

The Cyclotron and its Beams





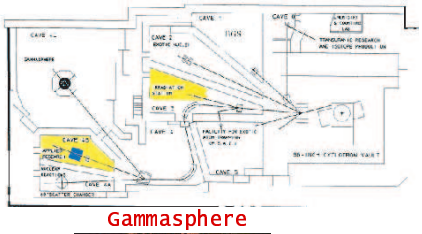
THE VENUS ECR ION SOURCE



The 88-Inch Cyclotron facility is unique among U.S. facilites in its ability to produces heavy-ion beams of both high-intesity light ions and heavy ions throughout the periodic table. Light ions -p,d, He-3, He-4 - are produced with intensities of 10s of particle microamps and energies up to 55,65,135 and 130 MeV, respectively. For helium to oxygen, beam energies are generated up to 32 MeV/nucleon; for heavier ions, the maximum energy per nucleon decreses with increasing mass. Rare stable isotopes are accelerated with good efficiency. The radioactive beams C-11 and O-14 have been developed by coupling the 88-Inch Cyclotron with a nearby medical isotope production cyclotron. Heavier radioactive beams are under development. VENUS -a third-generation, superconducting ECR ion source - will begin operation in 2003, further extending the capabilities of the Cyclotron.

The Cyclotron Facility

Today's Cyclotron Facility



State-of-the-art equipment has been developed at LBNL for the low-energy nuclear science program, focused on the study of nuclei under extreme conditions and using nuclei as a quantum system to test fundamental symmetries and the weak interaction. The equipment includes:

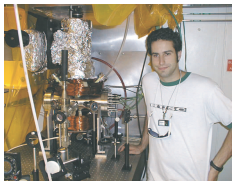
Gammasphere

a high-resolution, efficient array for detecting gamma-rays

The Berkeley Gas-Filled Separator

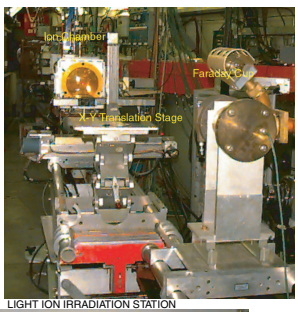
a high-efficiency, gas-filled magnetic separator, designed for physics and chemistry studies of heavy elements

Exotic Atom Trapping



magneto-optical traps for radio-active atoms and ions

Applied Studies at the Cyclotron

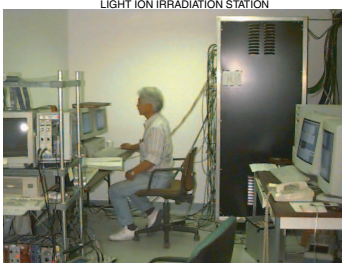


LIGHT ION IRRADIATION STATION

The 88-Inch Cyclotron also provides beams for the applications of nuclear techniqes in other areas of research, including biology and medicine, high-energy physics, materials and space applications. The effect of radiation on matter - whether it is a memory chip in a telecommunications satellite or the DNA in a human cell - is of prime importance for the future of spacetravel and the use of space. It is also important in ground-based systems, whether from natural radiation or man-made sources such as "dirty bombs". At the Cyclotron, two beamlines are devoted to these studies, the Heavy-Ion Irradiation Station in Cave 4b and the Light-Ion Irradiation Station in Cave 3b.

88" Applied Customers (Industry and Government):

Aerospace Corporation
Boeing
Defense Threat Reduction Agency
Eastman Kodak
European Space Agency
Honeywell
Jet Propulsion Laboratory
Mitsubishi
SUN Microsystems
UTMC



CAVE 4B COUNTING AREA

CONTACT:

http://user88.lbl.gov/

Dr. Peggy McMahan, Research Coordinator,

p_mcmahan@lbl.gov, 510-486-5980

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